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INSTRUCTIONS FOR THE CONTROL OF THE TUSSOCK MOTH IN NORTHEASTERN WASHINGTON IN 1956

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The Douglas-fir tussock moth, Hemerocampa pseudotsugata McD., is a defoliator of Douglas-fir and true fir, especially in a belt extending from south-central British Columbia to eastern Washington, northeastern Oregon, and central Idaho. Southward of this region it ranges to central California, northern Nevada, and possibly Colorado. In the past forty years a number of epidemics have arisen, the most spectacular being the 1946-1947 outbreak in the vicinity of Orofino, Idaho and Colville, Washington. At that time nearly half a million acres, primarily in northern Idaho, were sprayed with DDT by aeroplane for its control.

The most recent outbreak was discovered by State and Federal forestry agencies in 1953-54 at scattered points about Colville, Washington. Aerial and ground surveys by the Missoula Forest Insect Laboratory mapped 9,100 acres infested as of 1955. In addition, about 600 acres of infestation was found by the forestry staff of Potlatch Forests, Inc., east of Orofino, Idaho. Another 30,000 acres in the same general area, first thought to be uniformly infested, shows light feeding only in some spots. In California, an infestation was discovered on the Stanislaus National Forest. These infestations all appeared to have reached epidemic peaks in 1955 in the forested areas, according to advice received from the California Forest and Range Experiment Station and as determined from Missoula Forest Insect Laboratory studies of the Colville-Orofino infestations during the past winter. In the latter case parasitism of moth cocoons in all forested areas averaged 71.3 percent at Colville and 78.0 percent at Orofino. The ratio of new egg masses to old egg masses or to total cocoons is also very low. For these reasons spraying of the infested forests in 1956 was not recommended in these latter areas.

In the Colville area infestation damage appeared heaviest in small groups of fir trees surrounding farm buildings and separated from infested forests by cultivated land or grass pastures. The farmstead infestations are characterized by greater defoliation and a lower rate of parasitism of the cocoons. Trees have already been completely stripped in some areas, and it is probable that few farmstead infestations will be noticed in 1956. It is expected that many inquiries will be received about control of the caterpillars in these small but severe outbreaks. The following information will be helpful in planning for moth control in infested farmsteads.

LIFE HISTORY

The tussock moth passes the winter as egg masses which are glued to the parent's cocoons. They may be found anywhere in the tree, usually on the underside of the smaller twigs, but if a tree is heavily defoliated they may be grouped under the larger limbs or on the trunk. In late May the eggs hatch and the caterpillars start to gnaw on the undersides of the new needles, causing their tips to turn brown and giving the tree tops a "scorched" appearance by mid June, if the caterpillars are numerous. As they grow larger the caterpillars devour whole needles of any age. If defoliation is severe many caterpillars may then leave the tree to seek other food or shelter. They are mature in early August and spin a cocoon from which they emerge about two weeks later as adult moths. It is only the caterpillar stage which is destructive.

CONTROL

To prevent greatest defoliation control measures should be taken as soon as practical after top-scorching of the trees is apparent in June. The larvae may be killed by stomach poisons, such as lead arsenate, or by the newer organic insecticides, such as DDT, which kill on contact with the caterpillars. Spraying of coniferous trees from the ground during the summer months should not be done with oil-base insecticides, since the needles of the foliage may be severely damaged, or "burned" by the relatively heavy dosages. Light dosages of oil solution insecticides, applied as a fine mist spray from airplanes or mist blowers will not damage the trees. The following control techniques are advised for the tussock moth.

Aerial spraying.--For small groups of infested trees surrounding farm buildings or for extensive areas of infested forest. For airplane spraying a 12-percent DDT oil solution is most frequently used. This is made by dissolving 1 pound of the technically pure DDT (a gray or cream colored waxy powder) in 1 gallon of a mixture of 15 parts (by volume) of benzene, zylene, or methylated naphthalene and 85 parts of Diesel oil or No. 2 fuel oil.

Apply the above-formulated DDT insecticide in the form of a fine mist spray with a droplet size averaging between 50 and 300 microns in diameter at the rate of 1 gallon per acre from a height of 200 feet above the tops of the infested trees.

Avoid spraying farm fish ponds, vegetable gardens or berry patches since the DDT may kill fish and the oil in the spray may render vegetables and berries unpalatable. Ordinarily the amount of DDT deposited on garden produce or forage crops from the above dosage will be too small to cause any poisoning to humans or farm stock.

CAUTION.--DDT in pure form is poisonous and should be handled with care by those mixing the insecticide formulation. Safe handling of DDT is assured by following safety precautions on the package label.

Aerial spraying should be done only by licensed pest control flying services, but compliance with the above dosage and application technique must be assured.

Ground spraying.--Most feasible around farm buildings, especially in the vicinity of gardens which require protection from spray deposits. Ground spraying is not feasible for extensive areas of infested forest. Several insecticides are available for the control of the tussock moth, but any of the following formulas should give excellent control without damage to trees or plants when properly applied from the ground:

Formula I, lead arsenate

Lead arsenate, paste form	1½ pints
or	
Lead arsenate, powder form	5 pounds
Fish-oil soap	6 pounds
Water, to make	100 gallons

Formula II, DDT wettable powder

DDT, 50 percent wettable powder	2 pounds
or	
DDT, 25 percent wettable powder	4 pounds
Water	100 gallons

Formula III, 2½% aqueous emulsion

DDT, 25 percent emulsifiable concentrate	1 part (volume)
Water	9 parts

(Stir vigorously while mixing and using)

The above insecticides may be sprayed on the foliage of moth-infested trees by high-pressure power hydraulic sprayers mounted on trucks. The sprayers should be powerful enough to force the insecticide to the tops of the trees in the form of coarse or medium-fine droplets. The foliage should be wet to the point of dripping.

Trees may also be treated by applying an insecticide in the form of a fine mist forcibly ejected into the crown foliage by a mist blower. These efficient machines depend upon high velocity, low volume insecticide output. Mist blowers effect comparable insect control with 2½ quarts per tree of more highly concentrated insecticide than do power sprayers using up to 50 quarts of less concentrated insecticide per tree.

Some recommended tussock moth insecticide formulation for use with mist blowers are as follows (for 1-gallon portions):

Formula A

DDT, technically pure	2 pounds
Xylene	4 pints
White oil	½ pint
Triton X-100	3 ounces
Water	2.6 pints

Formula B

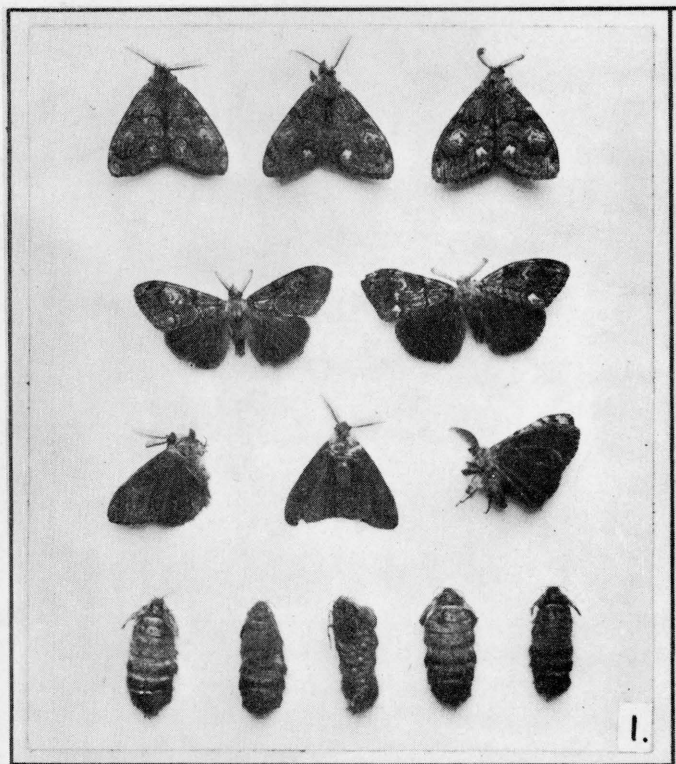
DDT, technically pure	½ pound
Xylene	1¼ pints
Triton X-100	1 ounce
Water	6.5 pints

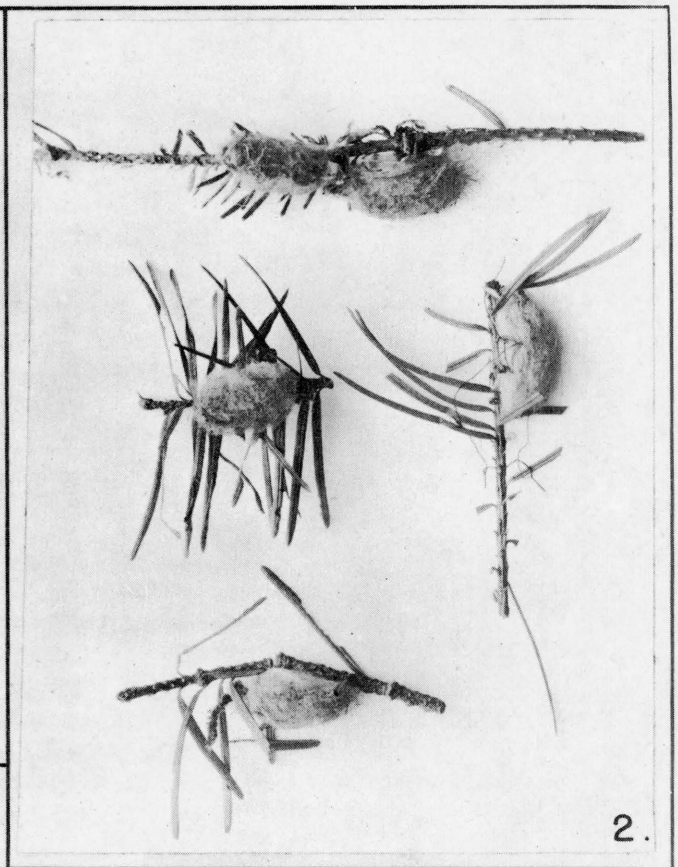
Timing of spray operations.--Both aerial or ground spraying should be undertaken while the tussock moth caterpillars are actively feeding on the fir tree needles. In normal seasons, spraying should be done during the month of June to be most effective. Although caterpillars are present in the trees until sometime in August and can be killed by spraying until then, earlier spraying will kill the caterpillars before serious foliage damage occurs. Spray during dry weather, preferably during early morning hours when the lack of wind will limit spray drifting.

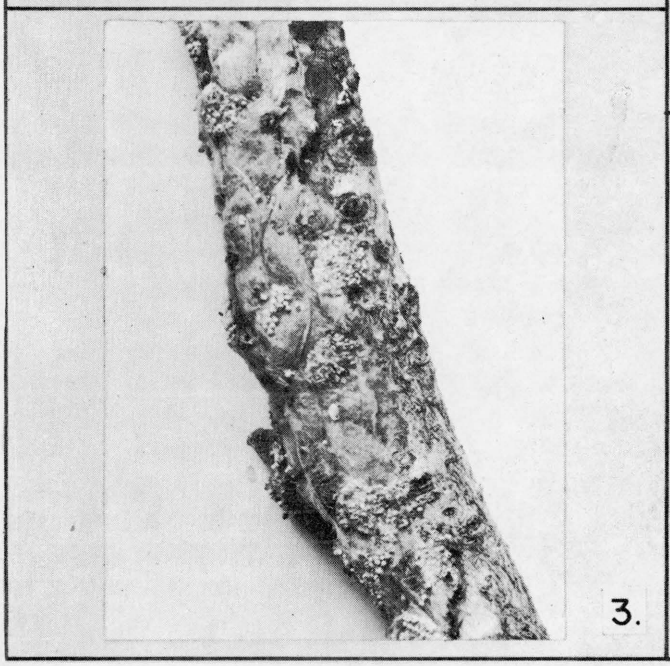
In spraying to control the tussock moth these things are important (1) correct insecticide formulation, (2) good insecticide distribution, and (3) proper timing of spraying. Because of the technical nature of the control methods, owners of infested forests or farmsteads may desire to contract this work with commercial pest control operators. Ground spraying can be done by landowners who have the necessary spraying equipment. For additional information on control methods and equipment contact your local farm forester or county agent or write to the Missoula Forest Insect Laboratory, U. S. Forest Service, Federal Building, Missoula, Montana.

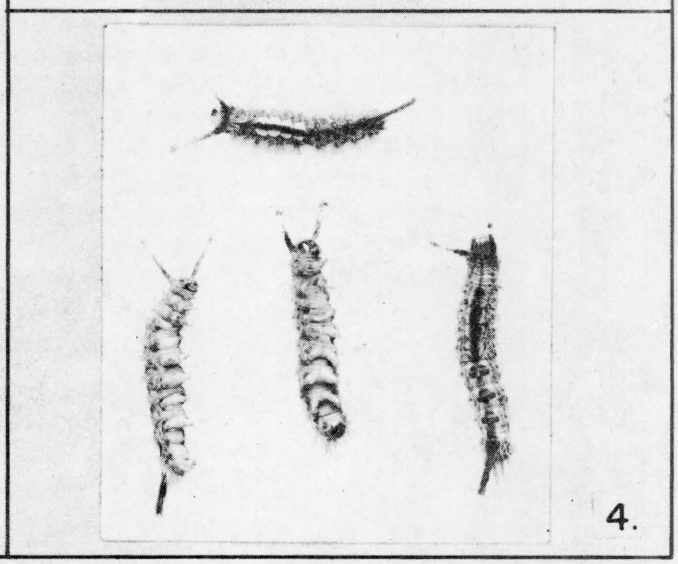
DOUGLAS FIR TUSSOCK MOTH

Hemerocampa pseudotsugata McD.









1. Male (winged) and female (wingless) moths.
2. Cocoons clinging to twigs and foliage.
3. Cocoons and hatched eggs remaining on a twig.
4. Mature larvae.

Agriculture – Missoula